

A NEW COMET.—By telegram to the Vienna Academy of Sciences, with which body rests the award of the medal for cometary discoveries, it is announced that a telescopic comet was detected on July 7 by Mr. Swift, of Rochester, N.Y. The place at 14h. was in R.A.  $265^{\circ}$  and N.P.D.  $72^{\circ}$ , if the telegram is to be read according to the suggestion of the late Prof. Littrow; the comet was a faint diffused object, and had a slow motion towards the south-west.

It would be an advantage if arrangements could be made for the communication of telegraphic notices of these discoveries to the Royal Astronomical Society, which is the proper centre for such information in this country.

MINOR PLANETS.—On June 26 Prof. Peters detected No. 188 in R.A. 15h. 37m., N.P.D.  $106^{\circ} 18'$ , shining as a star of the twelfth magnitude. No. 173, discovered by Borrelly on August 2, 1877, has been named *Ino*, and No. 180, which was found by Cottenot on February 2, 1878, it is proposed to call *Eucharis*.

SATURN'S SATELLITES.—Mr. Marth has again prepared, evidently at great trouble, ephemerides of the five inner satellites of Saturn, which will be found in Nos. 2,205-6 of the *Astronomische Nachrichten*, as far as October 23, the conclusion to follow. With such elaborate prediction, the regular observation of these faint objects should be assured; indeed Mr. Marth's exertions in this direction have already led to excellent results.

#### BIOLOGICAL NOTES

THE MALE OF SALPÆ.—The development of the spermatozoa in the Salpæ has hitherto not been satisfactorily studied. Only two years ago Mr. Brooks, of Boston, stated that the testis developed from the elæoblast, and moreover maintained that of the two generations which alternate in these pelagic Tunicates—the one set, the “chain” Salpæ, are exclusively males, whilst the other set, the “solitary” Salpæ, are exclusively females. This view involved the theoretical assumption that the single egg which is found in every individual of a chain of Salpæ does not *really* belong to that individual which is only a male, and has the egg laid into it by the solitary Salpæ from which the chain is derived by budding. Accordingly, the elæoblast in the solitary Salpæ which, according to Brooks, is female, represents the testis and points to a primitive hermaphroditism; whilst in the chain Salpæ (actual males, according to Brooks), the elæoblast becomes testis. The more usual view is that the solitary Salpæ are not sexually differentiated at all, and that the chain Salpæ are hermaphrodites. Prof. Salensky, of Kasan, has recently published (*Zeitsch. wiss. Zoologie*, 1878, Supplement 2) some observations on this matter, having previously given a very careful account of the development of these organisms, and at the same time he enters into a discussion of the relationships of various Tunicata which has much interest. He shows that the eggs found in the chain Salpæ cannot be regarded as given off from the solitary mother into the budded chain because there is no specialised ovarian cord or rudiment in the proliferous mother. She differs in this respect from the adult proliferous persons in Pyrosoma—which really, as shown by Huxley and by Kowalewsky, give to their buds a part of their own ovarian rudiment. The solitary Salpæ has nothing of the kind to give. Further, Salensky shows that the elæoblast has nothing to do with the testis. It exists in the solitary Salpæ, and in the chain Salpæ appears only for a brief period, and then disappears; but is certainly *not* developed into a testis. Accordingly the solitary Salpæ is devoid of all trace of either ovary or testis. The elæoblast appears very probably, according to Salensky, to represent the notochord. The tailed larvæ of the true Ascidiæ possess a well-developed notochord, and present to us the ancestral form of the Tunicata, which only persists to the adult

condition in the Appendiculariæ. In the Ascidiæ the tail and notochord atrophy as development advances. In Doliolum the young form which develops from the egg has a short tail with an axis apparently intermediate in character between the notochord of the Ascidian tadpole and the elæoblast of the Salpæ. The sexual form of Doliolum developed by budding from a second sexless generation, is devoid of tail. Salensky holds that we must distinguish in the Tunicata such simple budding from the adult as is presented in the Pyrosoma colonies and others, and that kind of budding which definitely characterises the alternation of generations morphologically distinguishable from one another. The sexless nurse, constituting the one generation, appears to retain the characteristics of the ancestral Tunicata form with tail and notochord. It corresponds to the Ascidian tadpole, and is represented in more or less completely modified condition by the tailed sexless nurses of Doliolum, by the solitary Salpæ, and by the Cyathozoid or primary person of the Pyrosoma colony, which gives rise to the colony by a process of budding which it is necessary to distinguish very widely from that which the persons of the colony exhibit at a later stage themselves. Just as the Ascidian tadpole becomes itself atrophied and metamorphosed so as to form the sexually mature Ascidian, so do the “nurses” above mentioned give rise by budding to a generation not possessing their own archaic characters, but bearing sexual organs and corresponding to the adult Ascidian, and thus we have an alternation of form in the successive gamic and agamic generations. Should multiplication by budding or fission be confined to the later sexual phase, then there is no morphological alternation of generations. Salensky thinks that a hopeful way of gaining a deeper insight into the phenomenon of true metagenesis lies in the further study of the cases presented by Tunicata.

E. R. L.

THE STRUCTURE AND DEVELOPMENT OF SPONGES.—The sponges are at present attracting a very large amount of attention from zoologists and are undergoing investigation in the fresh condition, so that their living soft tissues are subjected to the refined methods of modern histology. Prof. Franz Eilhard Schulze, of Gratz, is foremost in this study, the way in which was led by Ernst Haeckel in his monograph of the Calcispongæ. Dr. Keller, of Zürich, who has previously published on the development of certain calcareous sponges, has now (*Zeitsch. wiss. Zoologie*, 1878, part 4) given attention to *Reniera semitubulosa*, O. Schm., a representative of the commoner marine fibrous sponges. Schulze, by the use of silver nitrate, discovered a differentiated epithelial covering to the body surface, which was previously denied by Keller, who now admits Schulze's observation to be correct, and adds a similar observation of his own on *Reniera*. Keller describes the syncytium of *Reniera*, denies the existence of muscular cells, and recognises certain “nutritive wander-cells” in the body-wall of the sponge. His observations on “starch-containing cells” are of special importance. He was led to attach a high functional importance to the nutritive wander-cells which pass inwards from the flagellate endoderm-cells, carrying with them assimilated matter necessary for the nutrition of the syncytium, which forms a thick wall beyond. His conception of their importance was confirmed by the discovery that many of them contain starch. Keller has made an extensive search for starch in the cell-elements of sponges, and has found it, or rather we should say has obtained the blue reaction with iodine, in cells from the following sponges:—(1) *Spongilla lacustris*, (2) *Reniera litoralis*, nov. spec., (3) *Myxilla fasciculata*, (4) *Gordia gigas*, (5) *Tethya lyncurium*, (6) *Suberites massa*, (7) *Suberites flavus*. The substance, whatever it may be, which gives the blue reaction, is not in a granular condition, but fluid, and in those cells in which it occurs occupies a large vacuole comparable to a fat vacuole. Neither ordinary nor absolute alcohol, nor

cold water, dissolve the contents of this vacuole. Keller could not find this starch-like substance in *Halisarca* nor *Chondrosia*, nor in any *Calcispongiae*. It seems desirable in this connection to refer to the strictly granular condition in which chlorophyll appears in the case of *Spongilla*, the granules having the form of concavo-convex discs. In colourless (etiolated) specimens of *Spongilla*, the same granules are present of a little different form, and as in *Neottia* and other similar plants, these granules turn green (develop into chlorophyll?) on the addition of strong sulphuric acid (see *Quarterly Journal of Micros. Science*, 1874, vol. xiv, page 400, where I have recorded these facts, and also that of the occurrence of starch in *Spongilla*, though I have not yet been able to find the authority for the latter observation, which was made many years previously to Keller's investigation). With regard to the question of the formation of a gastrula in Sponges, and as to the development of the endoderm of that gastrula into the endoderm of the adult sponge, and therefore the continuity of the archenteric cavity of the gastrula with the digestive cavity and canals of the sponge, Keller has some remarks to offer which do not, in point of fact, amount to very much. Like Franz Eilhard Schulze, Keller fell into a complete error in his earlier publication on the development of Calcareous Sponges. Haeckel, in his monograph, stated that the sponge embryo was at first a hollow one-cell-layered sac, on the inner wall of which a second cell layer formed, by delamination, whilst subsequently a mouth broke through. This was vehemently denied and ridiculed by Metchnikoff; it was also denied by Oscar Schmidt, and by F. E. Schulze, who published a beautiful set of drawings showing that after the embryo sponge had acquired some thirty or forty cells, one hemisphere of cells became granular and enlarged, and then invaginated—sunk into the other hemisphere—thus forming a gastrula with endoderm and archenteron by invagination. This account was at first accepted as the true one, but it was strongly insisted upon by Keller in his former memoir, that the orifice of invagination closes up, as in fact the blastopore so usually does throughout the animal kingdom, and that the young sponge is then a mouthless closed sac with two layers of cells. It was in this condition that Haeckel saw it and described the further stage in which the true mouth breaks through. There is, however, still a great difficulty about the development of the gastrula of sponges; for no one can doubt, who will examine a common calcareous sponge, or who looks at Barrois' valuable memoir on the subject, that F. E. Schulze was—as he himself has admitted—so far misled in his account of the development of *Sycandra raphanus* as to transpose two very important stages of the development. In fact, the concavo-convex stage of the embryo sponge, with one set of cells (endodermic) tucked into the narrower, clearer, longer, ciliate cells, actually precedes that in which the same cells form respectively a hemisphere of clear ciliate cells and a hemisphere of large swollen cells, not tucked into the former at all, but so arranged that a small central cavity is closed in by the two groups. How we pass from this stage to the young sponge, or even to the two-cell-layered sac, is still a complete mystery. One thing, however, is obvious. Haeckel could hardly have been led to the generalisation known as the gastræa theory, which, on the whole, is a truthful and productive generalisation, by erroneous observation. We must, therefore, respect his positive statements of fact.

E. R. L.

#### GEOGRAPHICAL NOTES

THE Swedish North-East Passage Expedition, under Prof. Nordenskjöld, was arranged to start from Tromsø about the 15th inst. in the *Vega*, which sailed from Gothenburg about the beginning of the month. The *Vega* is commanded by Lieut. Palander, who was second in command

of the *Sofia* in the polar expedition of 1868. Nordenskjöld's scientific staff consists of F. Kjellman, docent in the University of Upsala, who took part in the expeditions of 1872-3 and 1875; Dr. A. Stuxberg, who took part in the expeditions of 1875 and 1876; Dr. E. Almqvist, medical officer; Andreas Hovgaard, lieutenant in the Danish navy, physicist; and Giacomo Bove, lieutenant in the Italian navy, hydrographer, the last-named officially sent by his Government. The *Vega* is provisioned for two years, but if the state of the ice be favourable, Nordenskjöld hopes to reach Behring's Straits by the end of September. The *Vega* will be accompanied as far as the mouth of the Lena by a new steamer, the *Lena*, which will ascend the river of the same name, on which it is intended to ply, as far as the town of Yakoutsk.

AFTER an absence of several months Dr. Georg Schweinfurth returned to Cairo on June 13 from his exploring journey through the Arabian desert. He reports having crossed some fifty valleys in the desert mountains, which he entered near Atfieh; eventually he reached Mount Gharib, and later on the Nile near Siut. Dr. Schweinfurth intends returning to Europe for some time to recruit his health, which has considerably suffered.

PROF. BASTIAN, of Berlin, who has explored more or less in nearly every region of the globe, is setting out again for four years' work in Asia, and especially in Further India, from whence he hopes to bring home many additions to his already large ethnological collection.

THE long-talked-of voyage round the world, under the auspices of the Société des Voyages d'Etude, is at last coming off under the leadership of Lieut. Biard. The *Funon*, the vessel in which the expedition sails, leaves Marseilles this week. We have on several occasions alluded to this and other similar projects, very tempting but much too expensive to attract many passengers. In the present case only twenty-five student-passengers of various nationalities have been obtained. The *Funon* has on board three professors who will lecture on natural history, geography, physics, and meteorology. The expedition has been well planned, and if the programme is carried out to even a moderate extent, the young voyagers ought not only to enjoy themselves, but return with much more knowledge, and perhaps wisdom, than when they set out. The *Funon* proceeds westwards to North and South America, the archipelagos of the Pacific, Australia, and New Zealand, China and Japan, India and Egypt, returning to the Mediterranean by the Suez Canal. A considerable part of the eleven months or so the expedition is expected to be away will be passed in the various countries at which the expedition will touch.

IN No. 3 of the *Deutsche geographische Blätter* of the Bremen Geographical Society Herr Camill Russ has a long and valuable paper on the present position of Abyssinia; the author has an intimate personal acquaintance with the country. Dr. Sandeberg gives a graphic and instructive account of a pilgrimage in Russia, in the summer of 1876, to Solowjetsk, lying between Lake Onega and the White Sea, and for centuries one of the most celebrated places of pilgrimage in Russia. Dr. Bretschneider, physician to the Russian Embassy in Peking, sends a long letter, giving detailed instructions as to the best methods and seasons for travelling through Siberia and Mongolia to China, which will be found of great service to any enterprising tourist who may have time and money enough to spare for such an out-of-the-way journey. The letter conveys indirectly a good deal of information concerning Siberia and Mongolia.

IT is stated that the Lisbon Geographical Society reports favourably on a project for an exploring expedition in Portuguese Guinea.